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Parker et al. HST Observations of Ceres

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Analysis of the First Disk-Resolved Images of Ceres from Ultraviolet Observations with the Hubble Space Telescope

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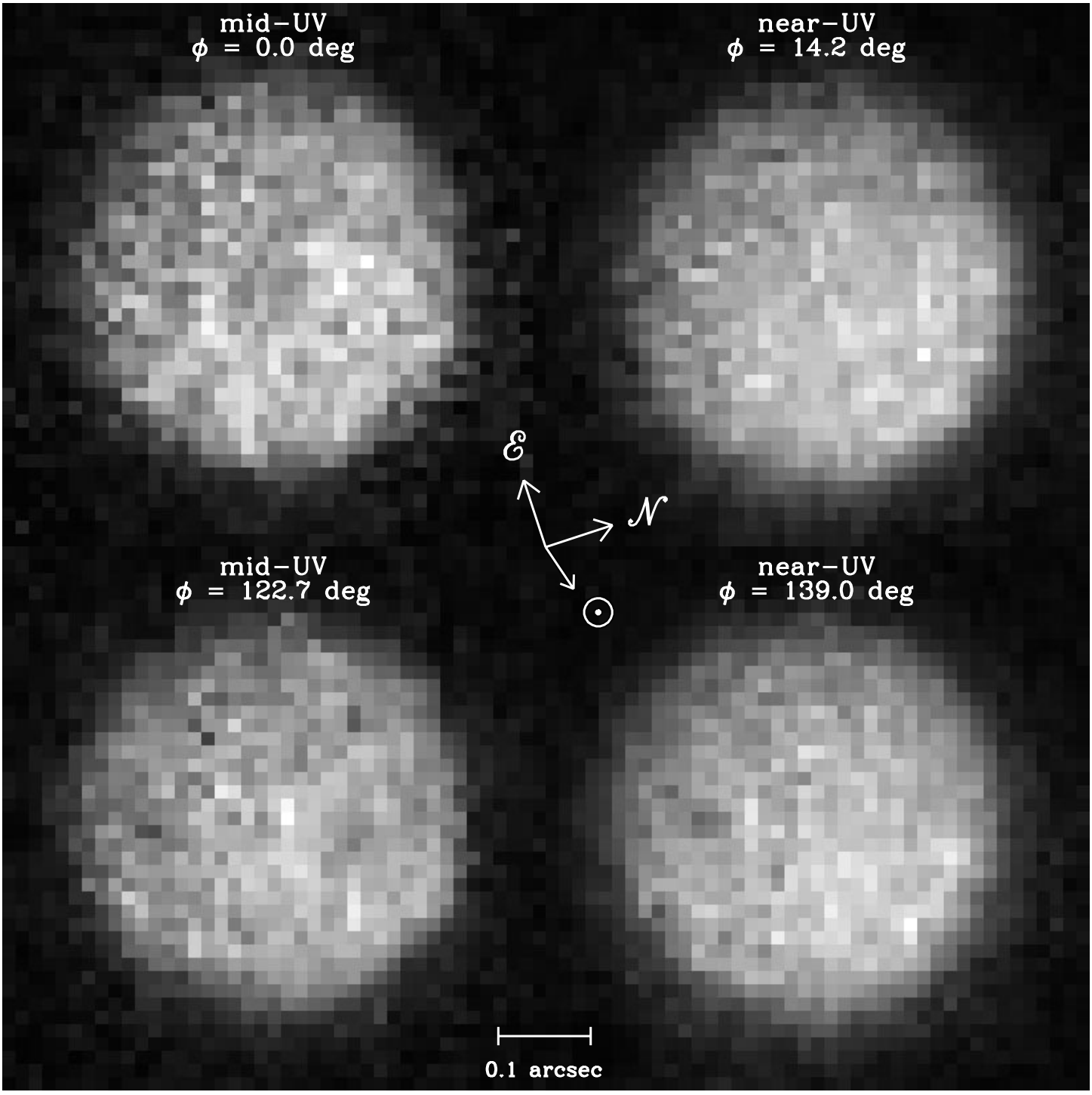
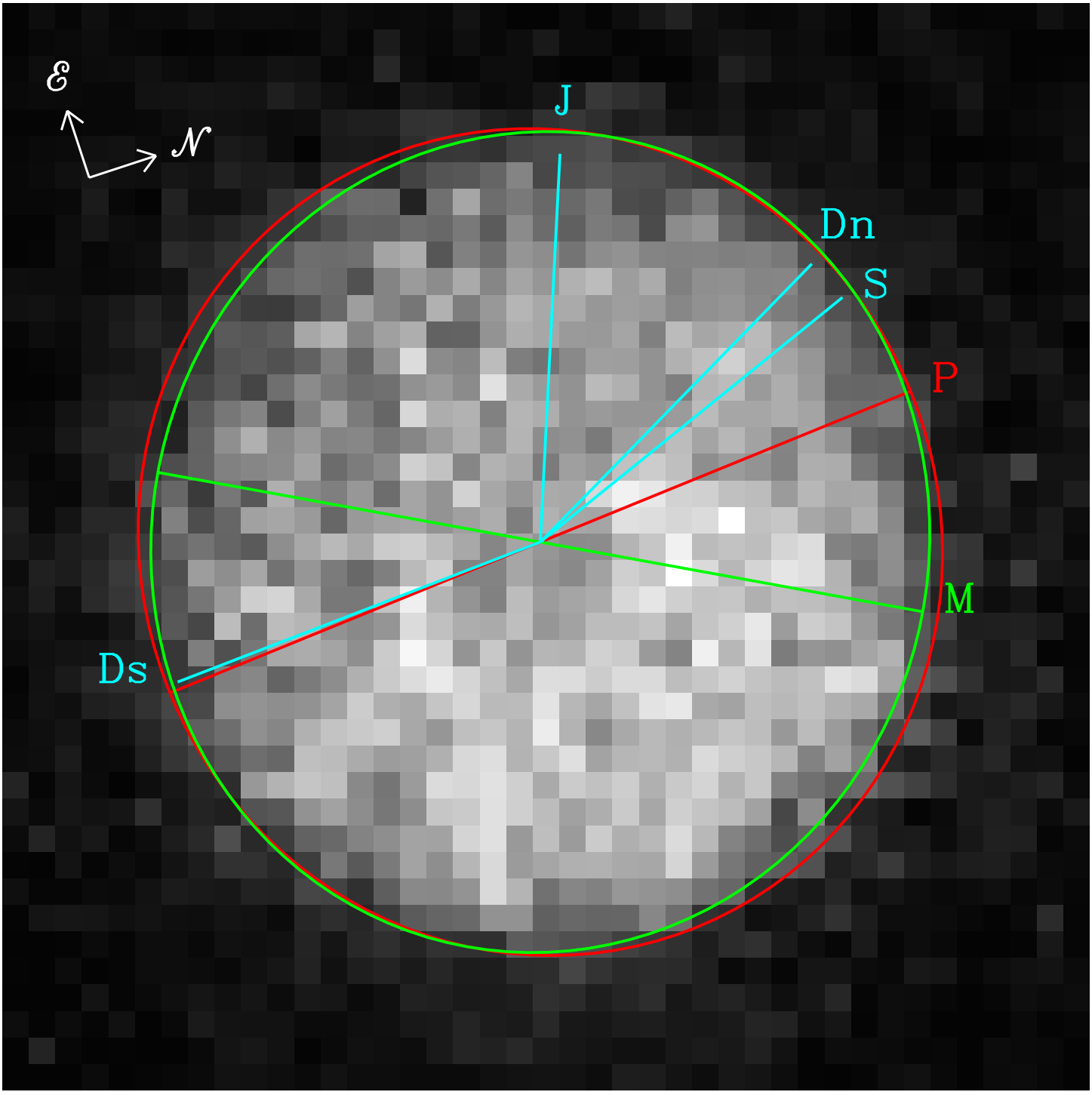
abstract

We present Faint Object Camera observations of the asteroid 1 Ceres at near-, mid-, and far-UV wavelengths (λ = 3636, 2795, and 1621 Å, respectively) obtained on 1995 June 25. The disk of Ceres is well-resolved for the first time, at a scale of $\sim$ 50 km. We report the detection of a large, $\sim$ 250 km diameter surface feature for which we propose the name "Piazzi"; however it is presently uncertain if this feature is due to a crater, albedo variegation, or other effect. From limb fits to the images, we obtain semi-major and semi-minor axes of $R_1 = 484.8 \pm 5.1$ km and $R_2 = 466.4 \pm 5.9$ km, respectively, for the illumination-corrected projected ellipsoid. Although albedo features are seen, they do not allow for a definitive determination of the rotation or pole positions of Ceres, particularly because of the sparse sampling (two epochs) of the 9 hour rotation period. From full-disk integrated albedo measurements, we find that Ceres has a red spectral slope from the mid- to near-UV, and a significant blue slope shortward of the mid-UV. In spite of the presence of Piazzi, we detect no significant global differences in the integrated albedo as a function of rotational phase for the two epochs of data we obtained. From Minnaert surface fits to the near- and mid-UV images, we find an unusually large Minnaert parameter of $k \approx 0.9$, suggesting a more Lambertian than lunar-like surface.


mid−UV
ϕ = 0.0 deg
near−UV
ϕ = 14.2 deg
mid−UV
ϕ = 122.7 deg
near−UV
ϕ = 139.0 deg
E
N
0.1 arcsec


E
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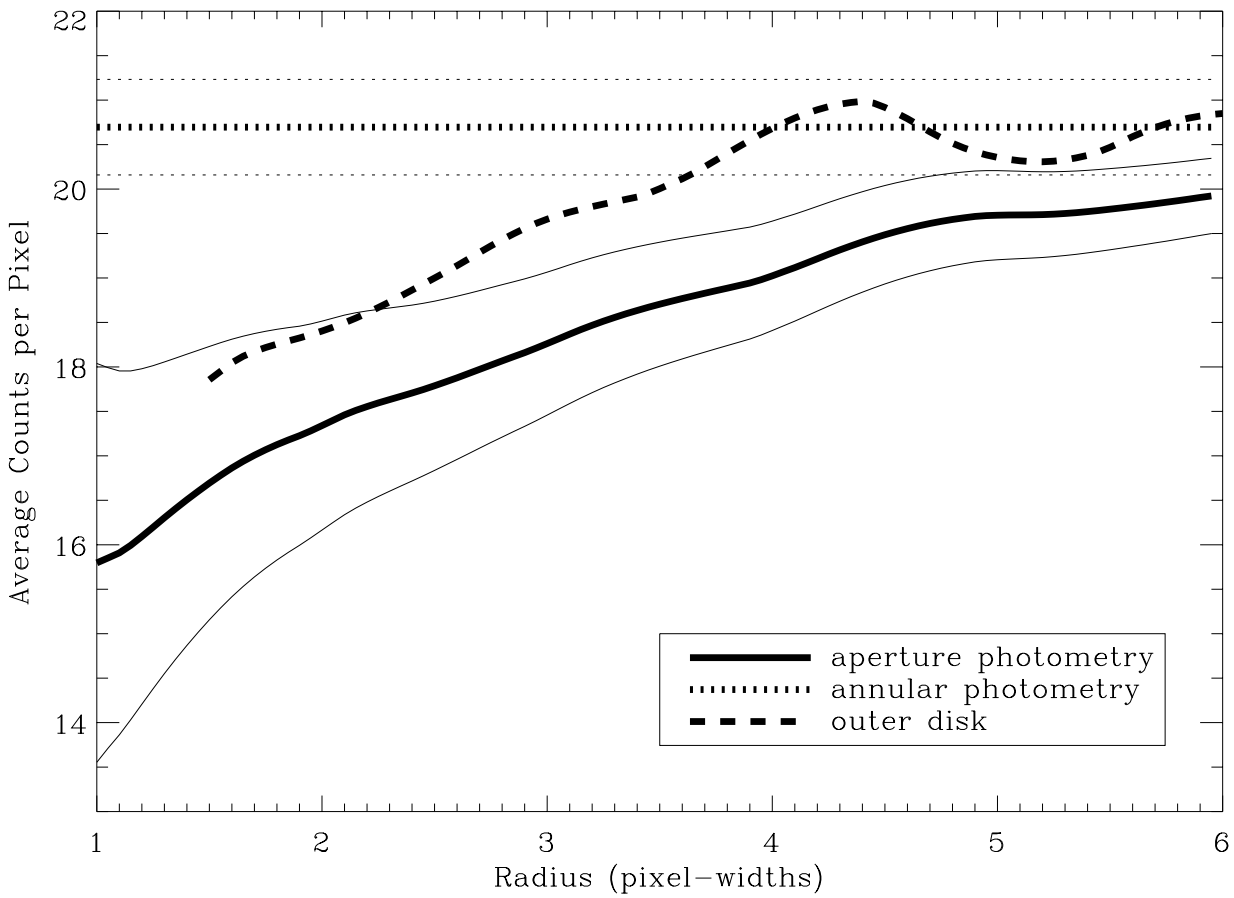
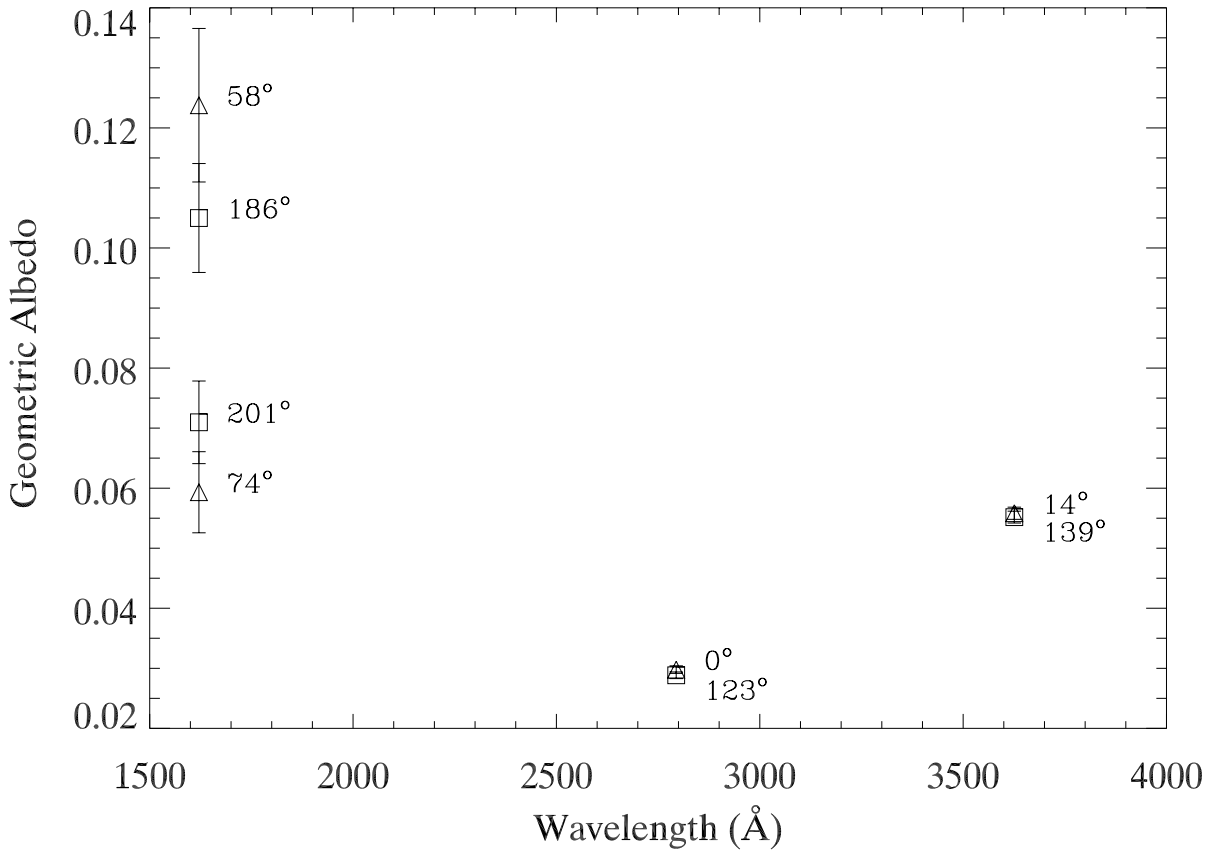
Ds


22
20
18
16
14
Average Counts per Pixel
1
2
3
4
5
6
Radius (pixel−widths)
aperture photometry
annular photometry
outer disk


0.14
0.12
0.10
0.08
0.06
0.04
0.02
Geometric Albedo
58°
186°
201°
74°
14°
139°
0°
123°
1500
2000
2500
3000
3500
4000
Wavelength (Å)